

***A Comparison of Size and Age at
Maturity of Hatchery and Natural
Origin Upriver Bright Fall Chinook
to the Hanford Reach***

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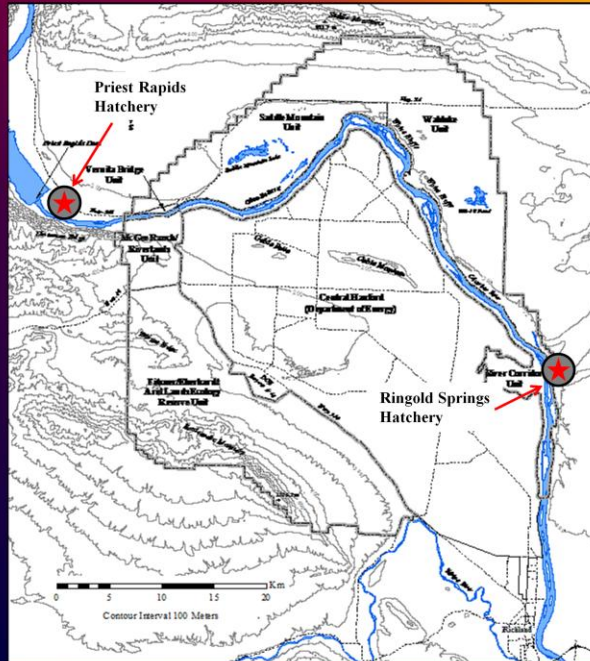
Hanford Reach

82km (51 miles) Richland
to Priest Rapids Dam

Only un-impounded, free
flowing section of
Columbia River

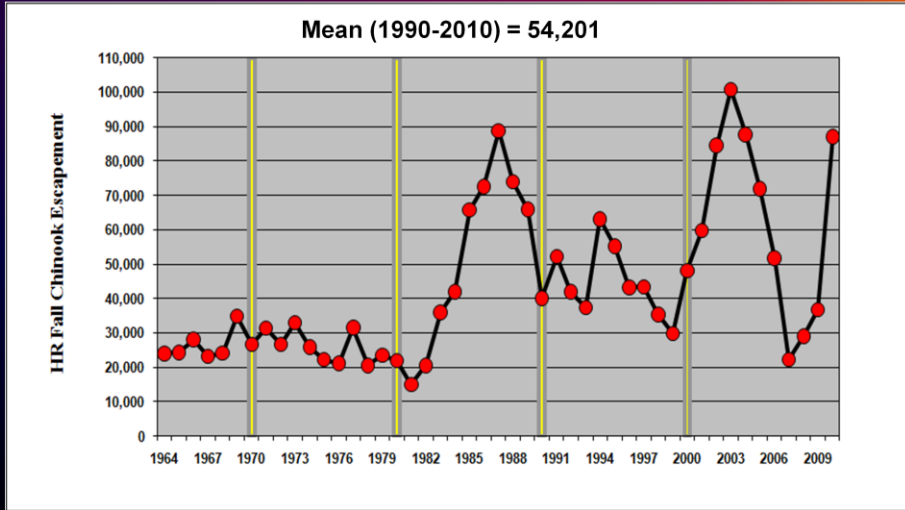
Legend

- Hanford Reach National Monument Boundary
- Management Unit Boundaries
- Central Hanford Boundary
- Route
- Open Water

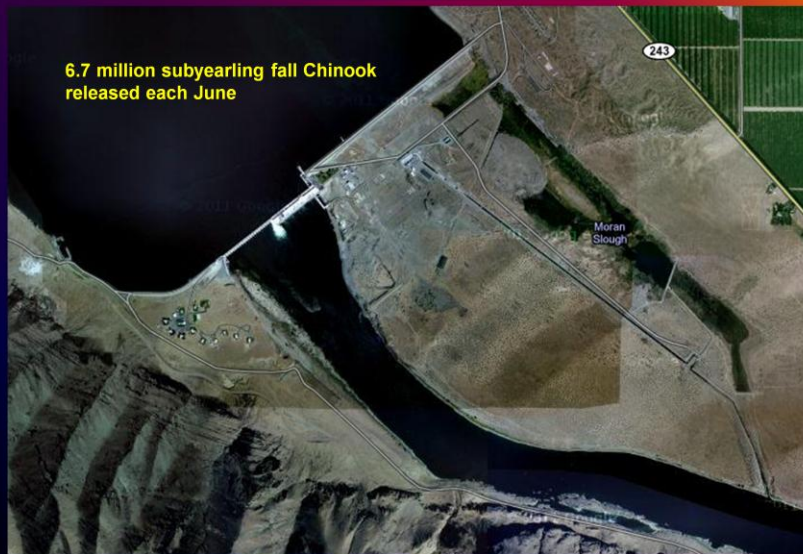


Hanford Reach URB

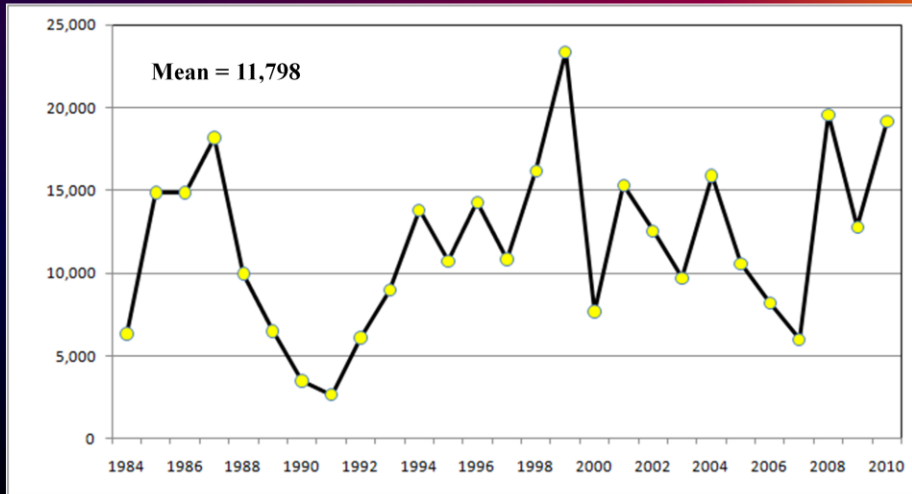
Large Up-River Bright fall Chinook population with high productivity



Priest Rapids Hatchery (1963)



Priest Rapids Hatchery Returns 1984-2010



Priest Rapids Hatchery

Originally a spawning channel

6.7 million release

Original source for Brood stock???

200,000 Ad+CWT (3% of release)

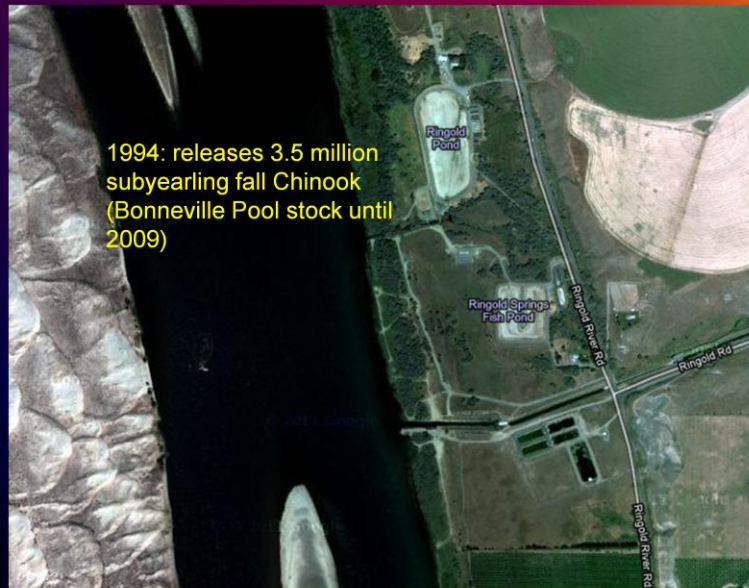
3,000 PIT

BY07 otolith marking 100% of release

BY08 1.7 million adipose only

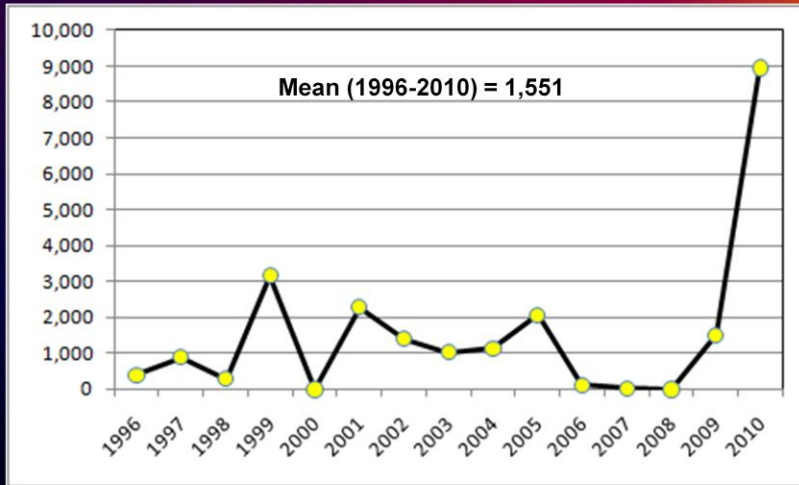
**BY09 (2010 release): 600,000 Ad+CWT,
1,100,000 CWT only**

Ringold Springs Hatchery (1950's)



1994: releases 3.5 million
subyearling fall Chinook
(Bonneville Pool stock until
2009)

Ringold Springs Hatchery Fall Chinook Production



Ringold Springs Hatchery

3.5 million release

Bonneville Pool fall Chinook

**200,000 Ad+CWT (5.7% of release)
No PIT**

BY07: 100% adipose

BY09: Priest Rapids stock

BY10: 100% otolith marked

Methods

- Compare size-at-age and age-at-maturity between hatchery and wild fall Chinook salmon between 1989 to 2010
- Age determined by scales
- Hatchery fish collected at a trap located at the end of a half mile channel

Sampling: CWT-100% of return,

Age & Gender: 10% of surplus, 25% of spawn

- Natural origin fish collected during carcass surveys in the Hanford Reach

Sampling: CWT-10-20% of return

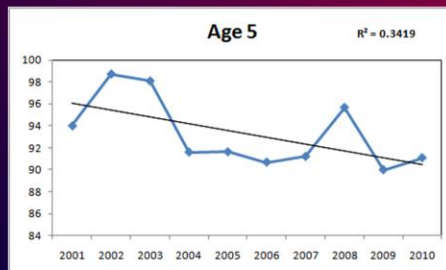
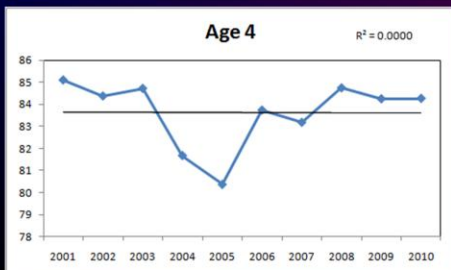
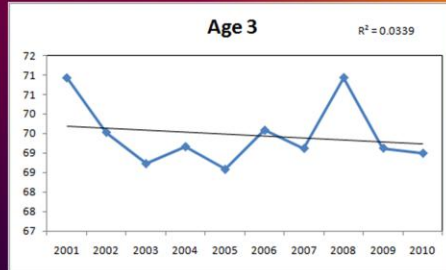
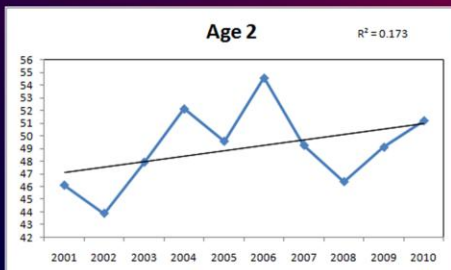
Age & Gender: Goal = 1,000 samples

Assumptions

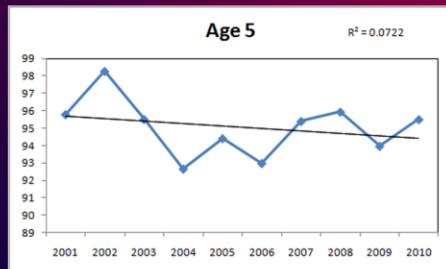
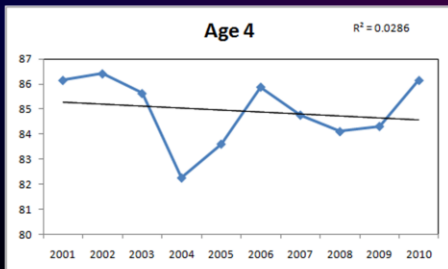
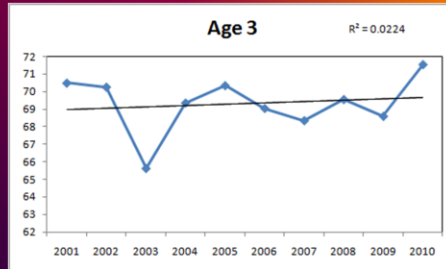
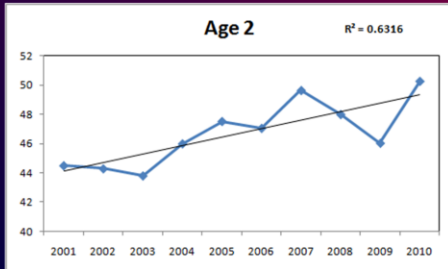
- Most fish returning to the hatchery are hatchery fish
- Most fish in the Hanford Reach are natural origin fish
- Because there are small mixtures (e.g., 1-15%) in the samples, we are less likely to detect a difference if one really exists ???

Otolith data!

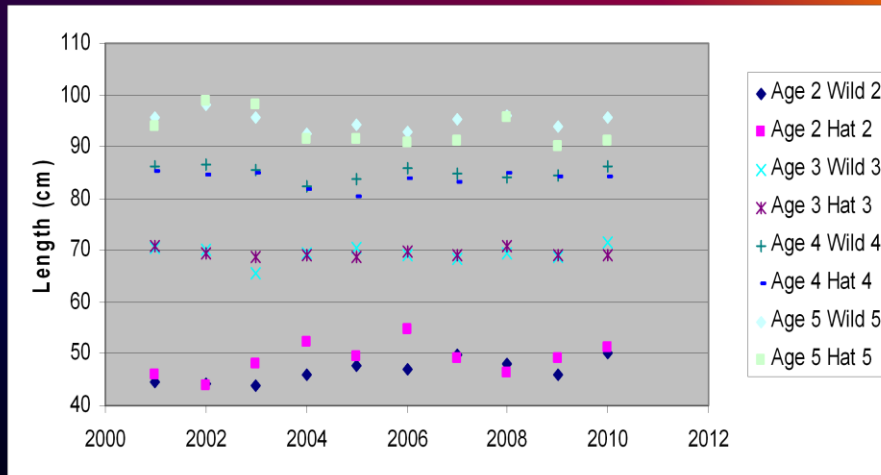
Trends in Length at Age for Priest Rapids Hatchery Returns (2001-10)



Trends in Length at Age for Hanford Reach Wild Returns (2001-10)



Size-at-Age (2001-2010)

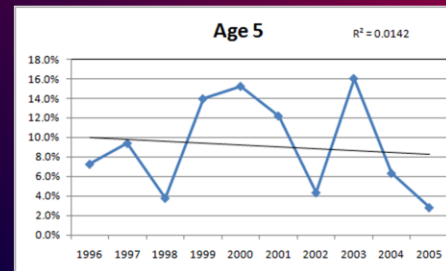
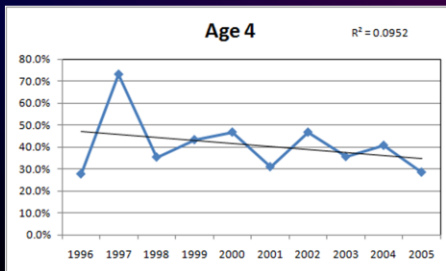
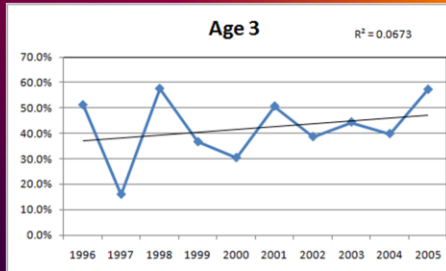
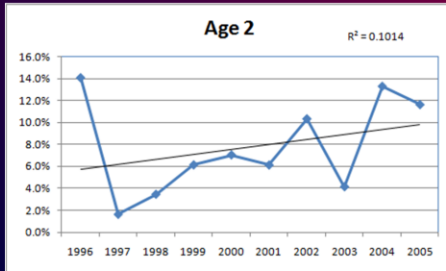


Mean Difference, 2000-2010

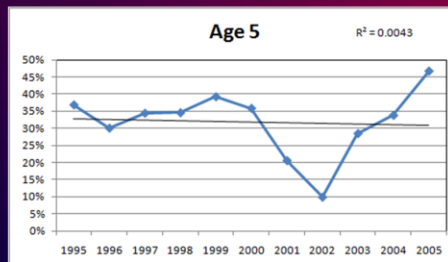
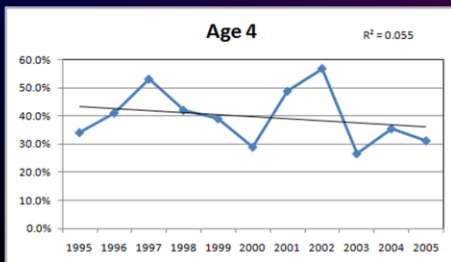
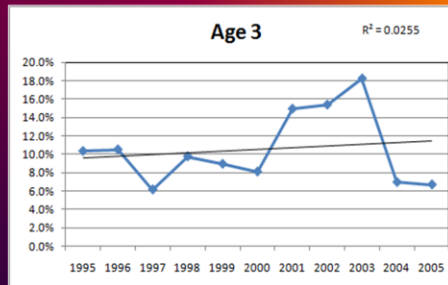
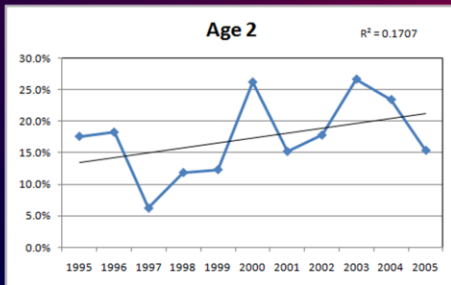


Hatchery fish appear to be larger than wild fish at age 2, similar at age 3, and smaller at age 4 and 5.

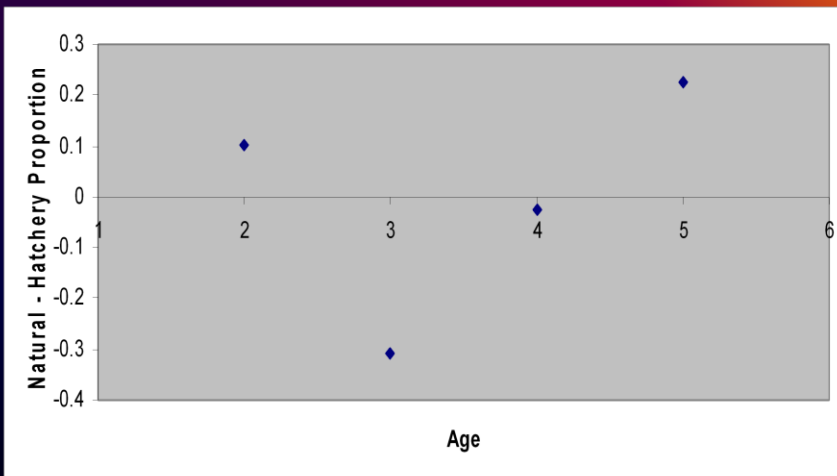
Trends in Age at Return for Priest Rapids Hatchery (BY1996 - BY2005)



Trends in Age at Return for Hanford Reach Wild (BY1995 - BY2005)



W – H Age Comp. BY 95-2005



Preliminary Findings

Size at Age

- No detectable change in size-at-age between 2001 and 2010
- Hatchery fish appear to be larger than natural origin fish at age 2, similar at age 3, and smaller at age 4 and 5

Age at Return

- No significant change in Age Composition between BY 1996 - 2005 (hatch or wild)
- Hatchery fish returns are predominantly Age 3 (42%) and Age 4 (41%)
- Natural origin fall chinook are predominantly Age 4 (40%) and Age 5 (32%)

Potential Bias

- Hatchery composition likely unbiased (~100% recovery)
- Stream surveys (carcass) less likely to sample Age 2 and males of all ages

(Difference in female composition sport, hatchery, natural spawn)

- Jack numbers based on ladder counts (wild)
- Jack numbers based on hatchery counts (fork length)
- Unable to separate hatchery from natural production
- Evaluate how to correct bias

Hatchery influence?

***Large hatchery returns in recent years and
low natural returns***

Future Work

- **M&E significantly expanded in 2010 to address multiple objectives**
- **Analyze data from known hatchery and natural origin fish using otolith mark detections**